BARRHAVEN DEMONSTRATION PROJECT:

"COLLECTION OF RIGID PLASTICS CONTAINERS IN THE BLUE BOX"

NOVEMBER 1989

TRANSONTARIO
PLASTICS RECOVERY INC.

Environment Ontario

Jim Bradley
Minister

ISBN 0-7729-6350-9

BARRHAVEN DEMONSTRATION PROJECT:

"COLLECTION OF RIGID PLASTICS CONTAINERS IN THE BLUE BOX"

Report prepared for and sponsored by:
Ontario Ministry of the Environment
The Society of the Plastics Industry of Canada
TransOntario Plastics Recovery Inc.

Report prepared by:
TransOntario Plastics Recovery Inc.

NOVEMBER 1989

Copyright: Queen's Printer for Ontario, 1989
This publication may be reproduced for non-commercial purposes with appropriate attribution.

Acknowledgement

This study was jointly sponsored by TransOntario Plastics Recovery Inc, the Ontario Ministry of the Environment and the Society of the Plastics Industry of Canada (via EPIC Environment and Plastics Institute of Canada).

TransOntario Plastics Inc. acted as the contractor for the development and implementation of the methodology; coordination of the subconsultants; collection of data; liaison with the operator and presentation of findings resulting in a report. Based upon these results, an analysis of the data and preparation of a summary report was jointly undertaken by the Recycling Subcommittee of EPIC to provide guidance to municipalities and recycling operators for the establishment of plastics recycling in their communities.

We wish to acknowledge the cooperation and assistance of the following:

The City of Ottawa
Nepean and the Residents of Barrhaven
Laidlaw Waste Systems Ltd.. (Ottawa)
Lummus Development Corporation (Columbus, GA, USA)
Shred-Tech Limited (Cambridge, Ontario)
Applied Polymer Technologies (Edmonton, Alberta)
Domtar
All others who participated in the project.

Disclaimer

"This report was prepared for the Sponsors as part of a jointly-funded project. The views and ideas expressed in this report are those of the authors, and only reflect an analysis and assessment of the study results within the limits of the project, but do not reflect the policies of the sponsors; nor does mention of trade names of firms participating or commercial products constitute an endorsement or recommendation for use."

Any subsequent user of the results and findings of this report should bear in mind the preliminary nature of plastics recycling and the involvement of the public and municipalities in multi-material curbside recycling.

ABSTRACT

The Barrhaven pilot demonstration was undertaken to ascertain the added effort/equipment involved, the actual quantities, and types of plastics collectible,in Municipal Solid Waste (MSW) when rigid plastic containers are added to an existing BLUE BOX project. The results from this project should be of benefit to municipalities contemplating the addition of plastics and to reycling operators.

The scope of the project was to obtain data on the impact of the addition of rigid plastic containers upon an existing curbside Blue Box system.

By weight, rigid and flexible plastics constitute about 5 - 7% of the estimated 10 million tonnes of (MSW) landfilled annually in Ontario. By volume, plastics take up 3 to 4 times this percentage.

Prior to the project the amount of other recyclable materials had been increasing. Four trucks are required to collect these materials from Barrhaven's 5800 homes. To collect plastics no on board reduction equipment was required but additional sorting time was, approximately one half hour per day.

The project was carried out over a 24 week period with an average participation rate of 51% (participation based on households putting out plastics at least once every four weeks). The average quantity of plastic containers collected was 7 lbs./household/year, based on 5800 total households.

For 9 weeks during the study the quantities of plastics from those households that set out plastics averaged 0.66 lbs./Blue Box. Data on frequency of participation indicated that the average household recycled on a biweekly basis. Therefore it was estimated that about 17 pounds of plastic could be expected per annum, from those households that recycle plastic.

The types of plastic collected were: PP/PE-75 %; PET-12 % ; and other (PS/PVC)-13%.

The project included a careful education and promotion component directed at the householder prior to and during the study. This facilitated participation and minimized contamination.

The volume and quantity of plastics collected did not warrant the use of densification equipment on the trucks. By monitoring householder participation and the quantities of plastics collected, adjustments to routes or vehicle capacity could be implemented before additional trucks or on-board densification equipment are required. The site for off-loading and procedures to sort plastics, particularly with the addition of flexible plastics, should be examined.

The objectives of the pilot study were met.The addition of plastic containers to a Blue Box multi-material curbside collection system is feasible. The addition of plastics will likely increase Ontario recyclers' revenues.

TABLE OF CONTENTS

		Page
Acknowledgement and Disclaimer		i.
Abstract		ii.
Executive Summary and Conclusions		2.
Introduction		3.
Objectives		3.
Study Area		4.
Method		4.
Public Awareness Programme		6..
Results		6.
Participation		6.
Quantity		7.
Volume and Volume Reduction		8.
Incremental Increase in Collection/Sorting Times: Plastics		8.
Types of Plastics Collected		10.
Summary and Conclusions		11.
Tables:		
Table 1	Plastics Quantity Summary	12.
Table 2	The Use of Plastics in Rigid Containers	13.
Table 3	Truck #802 (Loose)	14.
Table 4	Truck #816 (Loose)	15.
Table 5	Truck #817 (Perforator/ Flattener)	16.
Table 6	Truck #809 (Granulator)	17.
Figures:		
Figure 1	Weekly Collection- Plastics Containers	18.
Figure 2	Weekly Collection- Other Materials	18.
Appendices:		
Appendix 1	Methodology	19.
Appendix 2	Public Awareness Programme	20.
Appendix 3	Plastic Recycling in Ontario	21.
Appendix 4.	Glossary of Acronyms.	22.

EXECUTIVE SUMMARY AND CONCLUSIONS

The scope of this demonstration project was to obtain data on factors impacting upon the **addition** of the collection of rigid plastic containers to an existing curbside Blue Box system.

The following conclusions were obtained:

- Blue Box collection of rigid plastic containers **is indeed feasible and** plastic **should** be added to the products recycled in the Blue Box.

- To collect plastics from Barrhaven's 5800 homes required four vehicles **but not on-board reduction equipment. The amount of other recyclables had been increasing prior the pilot.** To acommodate plastics, the incremental sorting time per route was approximately one-half hour/day when collecting loose uncompacted rigid plastic containers.

- Plastic containers collected **averaged 7 lbs/household/year overall** for Barrhaven during the 24 weeks of study **or 17 lbs per participating household per year.**

- Residents of Barrhaven are willing to divert plastic containers from landfill with other recyclable materials: glass, steel, aluminium, and newspaper.

- Densification of the plastic containers was not necessary during the course of the pilot study. Equipment used for densification during the pilot study may require modifications for application in the future. Other prototype equipment and sorting protocols should be investigated for more efficient densification in the future.

- Careful education/ promotion, directed to the participating householder prior to and during the study, minimized contamination and facilitated participation.

- Post-consumer plastics recycled were: **PP/PE-75%**; **PET-12%** ; and **other (PS/PVC)- 13%.**

A note to future designers of collection systems for plastic containers: the volume and quantity of plastics collected did not warrant the use of densification equipment. Monitoring of participation and quantities of plastics in existing and future programs MAY POINT TO MODIFICATION OF EITHER ROUTES, OR VEHICLE CAPACITY AND ,THEN, DENSIFICATION EITHER ON-VEHICLE OR AT THE SITE OF OFFLOADING/ SORTING .

INTRODUCTION

Plastics are eminently recyclable. The success of plastics in packaging, and subsequent high visibility in landfill sites has led to an increased public desire to include plastics in the Blue Box (BB) system. Previous studies have shown that plastics, flexible and rigid, **by weight** constitute about 5 - 7% of the ESTIMATED 10 MILLION TONNES of Municipal Solid Waste (MSW) in Ontario and **by volume** take up from 3 to 4 times this, in terms of landfill capacity.[1]

The Barrhaven demonstration project was undertaken to ascertain the added effort/equipment involved, the actual quantities collectible, and the types of plastics in MSW when rigid plastic containers are added to an existing BB system. Data from this study would be of benefit to municipalities and recycling operators who are contemplating the extension of the range of materials collected in their BB system.

OBJECTIVES

1) To determine the available quantity of all types of rigid plastic containers in the residential waste stream by:

   a) volume

   b) weight

   c) type

2) To determine if volume reduction is necessary, and the reduction obtainable by:

   a) granulation

   b) perforation/flattening

3) To assess the incremental effect on the sort/collection time of paper, glass and metal with the addition of plastics.

---

1 The major impediment to implementation of recycling has been the lack of a system to gather the post-consumer recyclables from sources in order to process and send on to markets. The Ontario Ministry of Environment has tackled this head on by supporting municipal multimaterial collection systems throughout Ontario based on the "Blue Box" (BB). This initiative is supported by municipalities, and OMMRI (Ontario Multi-Materials Recycling Inc., the association set up by the Ontario soft drink bottlers and their suppliers).

STUDY AREA

Barrhaven in Nepean, part of the Regional Municipality of Ottawa-Carleton, is a growing community of about 5800 households. For the past year its Class 1 BB recycling system has been collecting paper, glass, steel and aluminum, with a 92% participation rate. The community is physically isolated from the rest of Nepean[2]. It is served by its own monthly community newspaper, entitled "The Barrhaven Bugle", affording a simple communications vehicle to inform the participating public. The Ottawa-Carleton program, one of the earliest in the province, did not collect plastics in any form, including the PET soft drink container, prior to the initiation of the study. Mixed plastics collection involved the addition of a completely new class of material. Rigid plastic containers, not plastic films, were the principal target of the study. The enthusiastic co-operation of senior personnel at Laidlaw, a private collection operator, to explore mixed plastics collection was another factor which led to the choice of Barrhaven as the locale for this pilot.

Laidlaw used four trucks in the Barrhaven area to collect recyclables on Wednesdays, the same day that packer trucks picked up garbage. The fourth vehicle was planned prior to initiation of plastics recycling.

METHOD

The overall period of the project was 24 weeks. It started October 19th, 1988 and ended March 29th, 1989. Plastic quantity data and analysis of collection impacts and participation rates were based on a shorter time-frame within the overall study period.

Three Labrie 30-cu.yd. side-loading recycling trucks were modified by the addition of an extra divider to create a 3.33 cubic yard front compartment for plastic containers. Two trucks (#802 and #816) were used to collect the plastic containers loose. Two months into the pilot (Dec. 14th) a third truck (#817) had its front compartment fitted with a hydraulically-driven perforator/flattener. This was a prototype designed and constructed by Lummus Development Corporation, of Columbus, Georgia, U.S.A. Thus modified, this truck was used in a compaction mode December 14th to February 15th. A fourth truck (#809) had its normal front compartment fitted with an hydraulically-driven granulator, a prototype model designed and constructed by Shred-Tech Limited, Cambridge, Ontario. This truck was operational October 19th to February 15th.

---

2 This means that there was minimal concern for communications spillover into non-involved areas.

Householders were asked to rinse out their used rigid plastic containers and put them into the Blue Box along with their usual glass containers, metal cans and bagged/tied newspapers.

The **volumes** of plastics collected in trucks #802, #816, and #817 were estimated to the nearest quarter cubic yard from graduation marks on the sides of the compartments. The granulated mixed plastics from truck #809 were **weighed** in the granulator receiving bag at its return to the depot.

Two samples of post-consumer plastic containers were taken during the study. The first was on November 8th, 1988, three weeks into the study. A team of plastics experts[3] sorted the sample into three groups: HDPE and PP, PET, and other (PS and PVC). The second was a sample of 1800 lbs. of mixed granulated chips from truck #809, which were sent to Applied Polymer Technology Inc., of Edmonton: these were classified in their process.

Collection time, motion, and volume studies were carried out to evaluate the incremental effort by the recycling operator to accommodate the addition of plastic containers. For more detailed information on the procedures used, see Appendix 1.

3 David Birkby of Plax Inc., Dr William Taylor of the Canadian Plastics Institute and Dr David Wiles of the National Research Council of Canada.

PUBLIC AWARENESS PROGRAM

Experience with many programs has shown that education and promotion of new initiatives is the key to wholehearted commitment and participation by the householder. A letter from Laidlaw, the collection operator, and a four-page information folder was developed by Energy Pathways[4], and delivered separately to all households during the week prior to the start of the demonstration project.

During the course of the project, The Barrhaven Bugle, a monthly newspaper carried ads. Specific ads, designed to encourage more participation and support were placed in The Nepean Clarion on January 15th and January 29th,1989.

The design and comprehensiveness of the educational/promotional campaign,assisted the residents of Barrhaven to respond to the study's request for rigid plastic containers, only. Neglible amounts of 'other plastic products' (eg. film, flexible bags, foam) were found in the material collected.

An existing telephone "hotline" was manned by Laidlaw personnel during the full time of the project; they did not receive many enquiries.

Examples of the promotional material used in the project are given in Appendix 2.

RESULTS

Participation

"Participation" is described in this report as the putting out of BB's for curbside collection by a household at least **once a month.** Moreover, collectors normally request that a householder put out a BB only **when it is full**: this is to minimize time-wasting, unnecessary stops.

Columns 5 and 6, **Tables 3 - 6**, give the total Blue Box and plastic-containing Blue Box counts, respectively.

4 Energy Pathways is an Ottawa consulting firm specializing in environmental matters.

A study on **one route only**[5], during the last 4-week period to pinpoint householder BB and plastics set-out frequency, gave the following results:

FREQUENCY	NO. OF HOUSEHOLDS (HH) WITH PLASTICS IN BB.
Weekly	53
3 out of 4 weeks	94
2 out of 4 weeks	243
1 out of 4 weeks	354
Total	744

A Barrhaven route has, on average, about 1450 households. If one defines "participation" rate as a household who places plastic out for pickup at least once a month, then Barrhaven residents during the course of the study participated 51% of of the time(744 households out of a possible 1450. Data on frequency of participation displayed above indicates that they were recycling plastic on a biweekly basis (1.79 weeks). In other words, it is likely that Barrhaven residents will recycle plastics every two weeks.

Barrhaven householders placed out for collection an average of about 2460 BB'S per week, of which about 48% on average contained plastics.Three trucks (#802, #816, and #817) collected, on average, about 650 BB's each, while the fourth (#809, with the granulator) collected about 500 BB's.

Quantity

The total weight of plastics collected during the 22-week period November 2nd to March 29th was 17,129 lbs. During the course of the total pilot study, analysis of the data collected indicated an initial plastic recycling rate of 0.134 lb./HH/week, or 6.97 lb./HH/year. For a period of 9 weeks, data on plastics collected by participating households was collected. The average amount of plastics for a participating household was 0.33 lbs./HH/week, or 17.16 pounds per annum.

Table 1 provides a summary of the plastics collected from the 5800 households in Barrhaven in the course of the study.(see page 12)

Table 2 illustrates the potential for rigid plastic containers of about 41 lb./HH/yr in Canada. (see page 13)

---

5 Truck #817

Figure 1 shows the weight of plastics collected per week versus time. Note that there appears to be an **increase** with time (as indicated by the least mean squares plot). More data, on an annual basis, would be desirable to determine that a trend in household recycling has been established which is either responsive to the availability of post-consumer plastics and/or seasonal variations.(see page 18)

Figure 2 describes the weight of other recyclable materials (newspaper, glass, metal). At the end of the pilot project,a slight **decrease** in the amount of material collected is indicated (by least-squares). Except for seasonal variation, the pilot study could not explain this apparent decrease in overall material recycled.(see page 18)

Volume and Volume Reduction

The density of loose uncompacted rigid plastic containers collected was 59.1 pounds per cubic yard, based on baling a sample of 106 cu.yd. which weighed 6,265 lb.

This density of post-consumer rigid plastics containers (lb./cu.yd), appears to be a function of the normal crushing, nesting (e.g. of margarine or cottage cheese tubs), the presence of lids, and the size of containers on average being smaller in Ontario compared with other jurisdictions.[6]

On-route collection of plastics from Barrhaven did not "cube out" vehicles, requiring the return of the vehicle to drop-off point.[7]

The granulator-equipped truck reduced plastic containers to a density of about 300 lb./cu.yd. and available capacity (2.5 cu.yds.) was not filled. Densification achieved,was about five times.

The perforator/flattener-equipped truck did not use up available capacity and compaction was about 1.6 times. The effectiveness of the compaction rate was verified by the manufacturer, Lummus, during post-pilot tests of Barrhaven-collected plastics .[8]

Incremental Increase in Collection/Sorting Times: Plastics.

The pilot study provided a 13-week monitoring period for recycled materials and their sorting from BB's in the 5800 HH of Barrhaven. Collection/sorting time averaged 15.1 seconds per household, varying in a range of 14 - 16 sec.[9]

---

6 Uncompacted HDPE milk bottles have a density of 24 lb./cu.yd., and uncompacted PET 2-litre bottles have a density of 30 lb./cu.yd.

7 "cubing out" is a term specific to compartmented recycling trucks: it indicates that a truck returns to its depot because **one** of the compartments is completely full.

8 Our thanks to Ron Schley, Director of Engineering, Lummus Development Corporation. Columbus, GA, U.S.A.

9 A monitoring run before the start of the project established that the average handling time per BB with glass, metals and newspaper was 16.86 seconds, made up of 13.40 sec. for sorting, and 3.46 sec. to and from truck. Variation between the drivers covered a range of 15.0 - 19.2 sec. The figure given above was used since it had a greater data base,and incorporated possible variations due to weather conditions.

There was an apparent "learning curve" effect on the drivers who participated during the pilot plastics recycling project.The average incremental time to sort plastics on-route was 19% less in the last-half of the study than the first half.Depending on the route, participation by householders, and type of densification on-board, the operator/vehicle improvement in the collection/sorting of rigid plastic containers ranged from 15 - 25%.

The collection/sort times for Blue Boxes during the period December 14th, 1988 to February 8th, 1989 represent an optimum for the study.The increase attributable to plastics in the Blue Boxes was:

Loose (#802 & #816)	7.37 sec./BB cont plastic
Granulator (#809)	10.25 sec./BB cont plastic
Perforator/Flattener (#817)	8.61 sec./BB cont plastic

Sorting times for plastic containers may be influenced by other factors, over and above the 7.37 seconds attributable to the sorting of plastic containers from individual BB at the curb. For instance the operation of densification equipment or off-loading the plastic must also be taken into account.

The incremental increase in time required to sort plastics, over a 9-week period during which comparable data was available, averaged approximately **34, 46, 51 minutes/day/route** for **loose, granulator, perforator/flattener**, respectively in one-man Labrie trucks with 2.5 cubic yards of on-board vehicle space available for plastic containers. (Note: there were four routes in Barrhaven).

Attention should be focused on methods to reduce the total non-productive time (35.5%) which includes travel time required to depart from and return to the depot at the end of the day, the time for mid-day return, weighing-in and unloading, and lunch and coffee breaks. More importantly, methods to encourage householders to put out more plastics and to maximize the effort of the recycling operators on-route in sorting plastic containers, should also be developed.[10]

Types of Plastics Collected

Identification of the type of plastic resins used to manufacture the containers collected was undertaken in two ways.

First, early in the program, a 20-cu.yd. roll-off container (1182 lb.) was separated by three plastics experts[11] into three gaylords. Second, three gaylords (about 1800 lb.) of material granulated on truck #809 were sent to a commercial firm[12] . The results were as follows[13]:

Study/Type	(HandSort)	(APT)
HDPE/PP	75 %	76%
PET	12.5%	10.8%
PS/PVC	12.5%	13.2%
Melt Index (HDPE/PP Regrind)		2.97
Specific Gravity (HDPE/PP Regrind)		0.954

10 E.g. by removing other materials first and dumping the plastic containers in one swoop, asking householders to put plastic containers in a separate bag, modifying the hopper/receiver system, etc.

11 See footnote 3.

12 Applied Polymer Technologies (APT) of Edmonton, Alberta. . At APT the material was divided into three lots and analyzed. This was done as a voluntary contribution to the project

13 For further discussion, see Appendix 3.

SUMMARY AND CONCLUSIONS

- The addition of the collection of rigid plastic containers to the present Blue Box system in Ontario is feasible. Initially, it can be done without the addition of more equipment .

- Based on the Barrhaven project, when collected loose, the quantity of rigid plastic containers will not "cube out"[14] the collection trucks. When a significantly larger volume of plastics appears in the post-consumer recycling stream then capital/operational costs of on-truck densification may become necessary.

- Both the granulator and perforator/flattener prototypes worked well. Several engineering details to minimize potential jamming, to optimize energy consumption and the efficiency of loading were noted and passed on to the designers which should minimize operator time in the future . A choice between the methods will depend more upon market requirements and cost/price of equipment to densify than upon the feasibility of sorting

- As the project progressed, quantities of plastics collected increased and overall participation seemed to increase. The 24-week timeframe for the pilot study does not permit drawing any more substantive conclusions.

- The ratio of plastics collected was: PP/PE to PET to other(PS/PVC), 75 to 12 to 13, respectively.

- The types, density and quantities of plastics collected may vary depending on location and/or season of year. Further monitoring of the recycling of plastic containers in other Ontario municipalities is necessary to determine maximum availability of plastics.

---

14 See footnote 7.

TABLE 1
PLASTICS QUANTITY SUMMARY

DATE	VOLUME CU. YDS		WEIGHT LBS		TOTAL[15] LBS
Truck Configuration	#802 loose	#816 loose	#817 perf./flat.[16]	#809 granulator	
11/02	2.75	2.0	2.75	82	496
11/09	3.25	2.75	3.0	125	657
11/16	2.5	2.5	2.75	105	563
11/23	2.5	2.5	3.25	148	636
11/30	3.0	2.5	2.75	110	598
12/07	2.5	2.5	3.25	175	663
12/14	2.25	3.0	*2.0*[17]	119	606
12/21	3.0	3.75	*2.75*	185	828
12/29	3.0	2.25	*2.75*	105	659
01/05	3.75	3.25	*2.5*	130	766
01/11	3.25	3.5	*3.25*	130	817
01/18	3.5	4.0	*3.0*	266	789
01/25	3.75	3.0	*3.0*	140	805
02/01	3.75	3.25	*3.5*	145	869
02/08	4.0	2.5	*3.5*	140	1,041
02/15	4.0	2.5	*3.25*	175	1,039
02/22	4.0	3.0	5.0	251[18]	960
03/01	4.5	3.0	5.0	236	975
03/08	5.0	2.0	3.5	118	739
03/15	5.0	3.5	5.0	118	917
03/22	3.5	3.5	3.75	236	872
03/29	3.5	4.5	5.0	266	1,034
Total					17,129[19]

15 Total weight arrived at by multiplying (sum volumes) X 59.1 lbs. per cubic yard

16 Compacted volumes from perforator/ flattener are multiplied by 1.6 for comparison.

17 Figures in *italics* are compacted volumes.

18 The granulator was removed and the weights based on estimated volumes thereafter.

19 An additional 1322 lbs. collected prior 11/02 are not included in this Table but are displayed in Figure 1.

TABLE 2.

THE USE OF PLASTICS IN RIGID CONTAINERS

Total quantity of plastics consumed in Canada (1986)[20]:	1,818 kilotonnes
Percent of this used for packaging:	33 %
Percent of plastic packaging as rigid containers:	30 %
Quantity of plastics in rigid containers:	180 kilotonnes, or 396 million pounds
Population of Canada	25.5 million
If 2.66 persons per household,	18.8 kg or 41.4 lb/household/year

KEY TO TABLES 3 - 6:

PRIMARY DATA SUMMARY BY ROUTE

AV ST PL:	Average sort time for Blue Boxes containing plastics
AV ST NPL:	Average sort time for Blue Boxes containing no plastics
INC TIME:	Incremental average (plastics) sort time [(AV ST PL) - (AV ST NPL)]
TOT BB:	Total number of Blue Boxes emptied
PL BB:	Total number of Blue Boxes containing plastics emptied
YD^3:	Total volume plastics collected
LB:	Total weight plastics collected.

20 Data supplied by SPI Canada

TABLE 3

Truck #802 (Loose)

DATE	AV ST PL	AV ST NPL	INC TIME	TOT BB	PL BB	YD³[21]
	(time in seconds)					
11/02	25.78	15.50	10.28	553	394	2.75
11/09	24.26	15.12	9.14	658	434	3.25
11/16	26.10	16.50	9.60	718	395	2.50
11/23	22.67	14.60	8.07	713	394	2.50
11/30	[22]	-	-	797	351	3.00
12/07	23.16	16.52	6.64	637	395	2.50
12/14	21.50	15.56	5.94	502	244	2.25
12/21	23.66	14.88	8.78	741	448	3.00
12/29	-	-	-	-	-	3.00
01/05	-	-	-	-	-	3.75
01/11	22.45	15.20	7.25	601	346	3.25
01/18	22.36	16.64	5.72	868	474	3.50
01/25	22.62	16.89	5.73	672	289	3.75
02/01	23.65	18.47	5.18	687	314	3.75
02/08	22.35	15.24	7.11	582	264	4.00
02/15	-	-	-	-	-	4.00
02/22	-	-	-	-	-	4.00
03/01	-	-	-	-	-	4.50
03/08	-	-	-	-	-	5.00
03/15	-	-	-	-	-	5.00
03/22	-	-	-	-	-	3.50
03/29	-	-	-	-	-	3.50

---

21 Estimated to nearest 0.25 cubic yard.

22 No time motion studies.

TABLE 4

Truck #816 (Loose)

DATE	AV ST PL	AV ST NPL	INC TIME	TOT BB	PL BB	YD³[23]
(time in seconds)						
11/02	28.30	14.93	13.37	614	283	2.00
11/09	22.00	14.68	7.32	720	367	2.75
11/16	20.86	11.58	9.28	608	303	2.50
11/23	-[24]	-	-	-	-	2.50
11/30	22.36	12.19	10.17	703	329	2.50
12/07	19.46	9.70	9.76	719	327	2.50
12/14	24.81	13.90	10.91	784	351	3.00
12/21	26.38	16.65	9.73	780	342	3.75
12/29	-	-	-	-	-	2.25
01/05	-	-	-	-	-	3.25
01/11	22.71	14.22	8.49	637	207	3.50
01/18	23.55	15.59	7.96	715	237	4.00
01/25	23.19	15.71	7.48	660	216	3.00
02/01	22.85	16.67	6.18	670	242	3.25
02/08	22.51	15.79	6.72	549	220	2.50
02/15	-	-	-	-	-	2.50
02/22	-	-	-	-	-	3.00
03/01	-	-	-	-	-	3.00
03/08	-	-	-	-	-	2.00
03/15	-	-	-	-	-	3.50
03/22	-	-	-	-	-	3.50
03/29	-	-	-	-	-	4.50

---

23 Estimated to nearest 0.25 cubic yard.

24 No time-motion studies.

TABLE 5

Truck #817 (Mobile Perforator/Flattener)

DATE	AV ST PL	AV ST NPL	INC TIME	TOT BB	PL BB	YD³ [25]
	(time in seconds)					
11/02	22.95	13.15	9.80	545	377	2.75
11/09	21.37	12.51	8.86	790	494	3.00
11/16	21.86	12.12	9.74	710	418	2.75
11/23	20.77	11.28	9.49	720	471	3.25
11/30	20.05	11.08	8.97	753	471	2.75
12/07	18.96	11.39	7.57	748	397	3.25
12/14	-[26]	-	-	-	-	2.00 [27]
12/21	21.72	15.20	6.52	486	285	2.75
12/29	-	-	-	-	-	2.75
01/05	-	-	-	-	-	2.50
01/11	23.13	14.44	8.69	525	320	3.25
01/18	26.68	16.51	10.17	668	348	3.00
01/25	22.11	15.22	6.89	608	330	3.00
02/01	24.97	14.31	10.66	706	438	3.50
02/08	21.75	13.00	8.75	582	378	3.50
02/15	-	-	-	-	-	3.25
02/22	-	-	-	-	-	5.00
03/01	-	-	-	-	-	5.00
03/08	-	-	-	-	-	3.50
03/15	-	-	-	-	-	5.00
03/22	-	-	-	-	-	3.75
03/29	-	-	-	-	-	6.00

25 Estimated to nearest 0.25 cubic yard.

26 No time motion studies.

27 Figures in italics volume of flattened containers estimated to nearest 0.25 cubic yard.

TABLE 6

Truck #809 (Mobile Granulator)

DATE	AV ST PL (time in seconds)	AV ST NPL	INC TIME	TOT BB	PL BB	LB[28]
11/02	27.14	15.31	11.83	511	230	82
11/09	21.45	9.50	11.95	624	216	125
11/16	19.83	10.31	9.52	671	322	105
11/23	18.90	12.00	6.90	619	262	148
11/30	27.31	13.59	13.72	531	282	110
12/07	21.28	4.01	17.17	670	399	175
12/14	-[29]	-	-	-	-	119
12/21	23.29	12.34	10.95	686	342	185
12/29	-	-	-	-	-	105
01/05	-	-	-	-	-	130
01/11	24.09	14.28	9.81	525	254	130
01/18	22.20	13.57	8.63	377	185	80
01/25	24.08	12.95	11.13	557	299	140
02/01	27.50	15.28	12.22	566	294	145
02/08	24.23	15.45	8.78	474	196	140
02/15	-	-	-	-	-	175
02/22	-	-	-	-	-	251[30]
03/01	-	-	-	-	-	236
03/08	-	-	-	-	-	118
03/15	-	-	-	-	-	118
03/22	-	-	-	-	-	236
03/29	-	-	-	-	-	266

---

28 Estimated to nearest pound.

29 No time-motion studies.

30 As of this date granulator taken off, pounds based on estimated volume of loose plastics.

Figure 1- Weekly Collection: - Plastic Containers

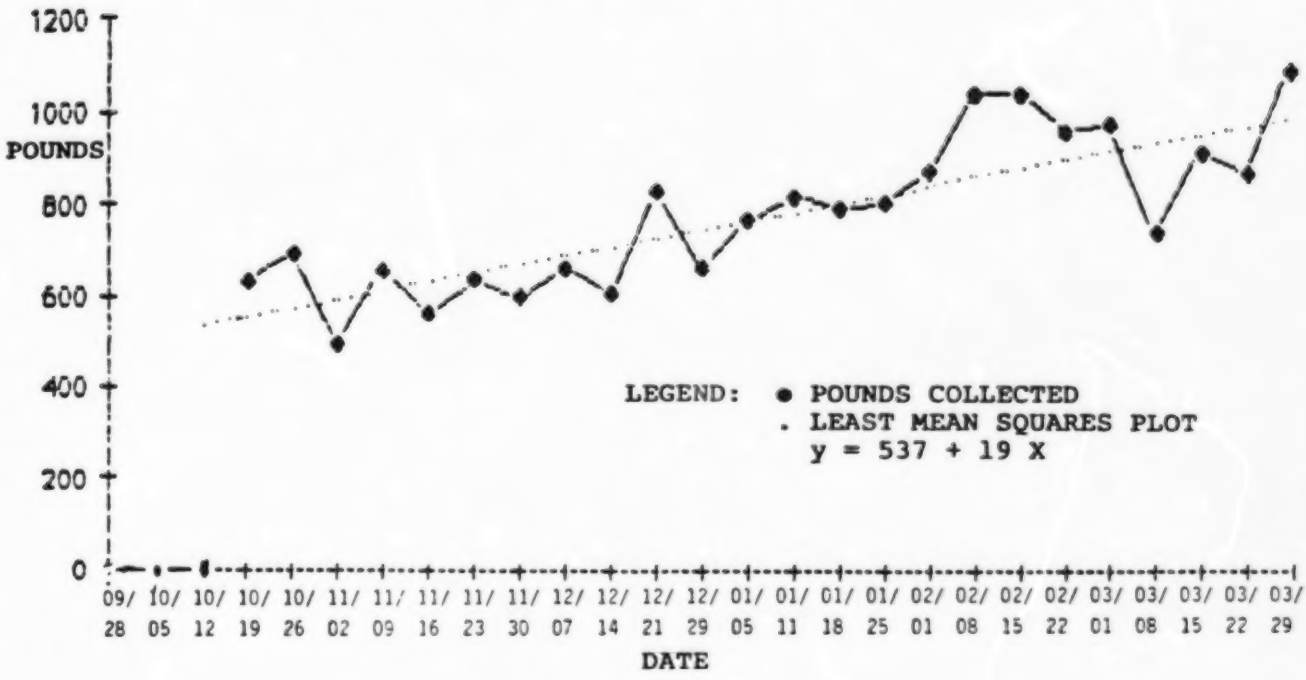
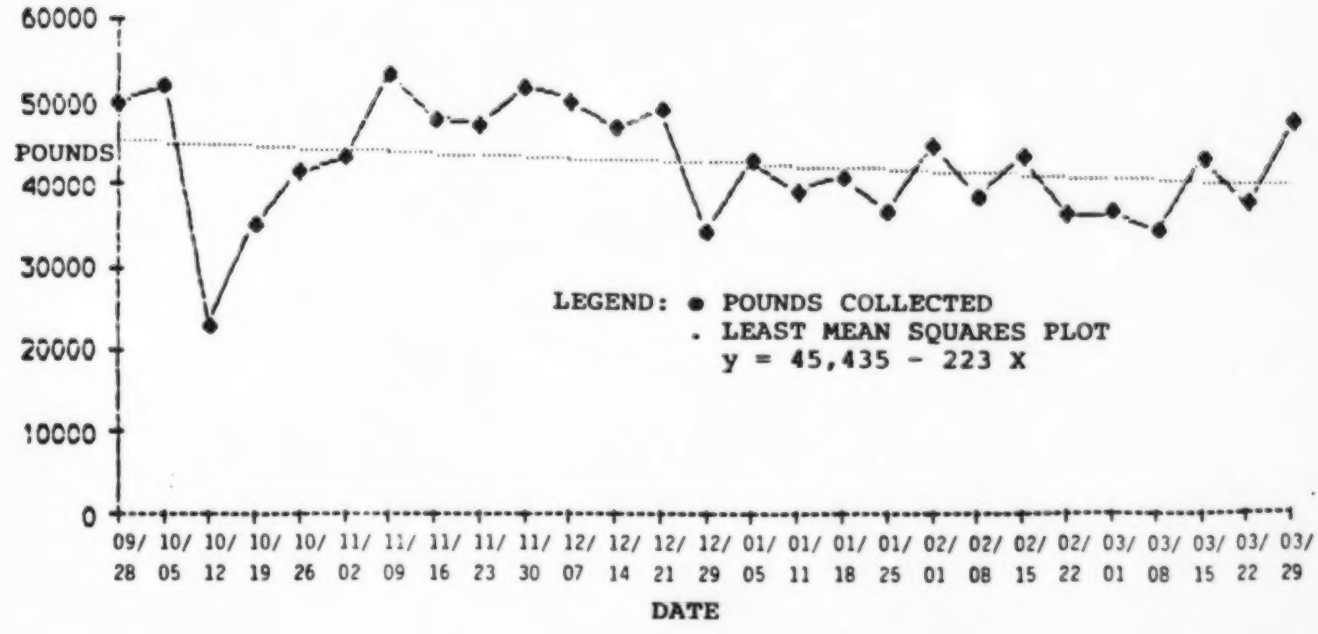


Figure 2- Weekly Collection: - Other Materials



Appendix 1: Methodology

Laidlaw typically uses Labrie trucks , approximately 30 cu.yd. Three of the four trucks used in the Barrhaven pilot had an extra partition installed in the front of the box to create separate compartments to collect the plastic containers. With dimensions of 2 x 6 x 7.5 ft. (W x D x H), the volume was 3.3 cu.yd. (Actual useable capacity for plastics was about 2.5 cu.yd.)

When the "loose" and "perforator/flattener" trucks returned to the depot to be weighed and then unloaded, the plastics load was levelled, and the volume estimated, using graduation marks painted on the walls of the compartment. For the "loose" loads, the weight of the plastics was obtained by multiplying the volume by 59.1 lb./cu.yd., a factor obtained as explained on page 6. For the flattened loads, the volumes were multiplied by a compaction factor of 1.6 (as explained in the third paragraph of page 7.), then multiplied as above. The fourth, granulator truck, had a bag suspended from the machine through a hole in the floor of the truck. This bag was removed and weighed to obtain the weight of the plastics collected.

The collection time-motion evaluation was measured with stopwatches on all four trucks. They are identified as follows:

- **Start:** time when the driver's foot touched the curb to when he started sorting, i.e., either when he touched the Blue Box (BB) or he touched material such as paper in/on the BB.
- **Sort:** time actually sorting, until the driver dropped the BB
- **Finish:** time from when he dropped the BB to when his foot touched the truck floor.

The four drivers work as a team so that no truck leaves Barrhaven until the community has been serviced. We have therefore treated the collection service as a whole. These studies were conducted during the period November 2nd, 1988 to February 8th, 1989, with the exception of December 29th, 1988 and January 5th, 1989.

Set out/sort times for BB's containing plastics were identified and kept separate from those of BB's not containing plastics. Weekly summaries were prepared from these records.

During the period January 18th to February 8th, 1989, 1,029 households on one route (#817) were monitored for BB and plastics **set-out frequency** as well.

Appendix 2: Public Awareness Program

Samples of the education and promotional material are provided as developed by the sub-consultants engaged by TransOntario Plastics Recovery Inc.

Energy Pathways Inc.

- **AN IMPORTANT NOTE ABOUT RECYCLING AND PLASTIC CONTAINERS**
- **Recycling Plastics in Barrhaven**

  An Important Research Project
- **News Release**

  PLASTICS RECYCLING TO BE TESTED IN BARRHAVEN
- **Communiqué de presse**

  LE RECYCLAGE DU PLASTIQUE MIS A L'ESSAI A BARRHAVEN
- **Recycling Backgrounder**

  THE BARRHAVEN PLASTICS RECYCLING RESEARCH PROJECT: QUESTIONS AND ANSWERS
- **Document d'information sur le recyclage**

  LE PROJET DE RECHERCHE SUR LE RECYCLAGE DES PLASTIQUES A BARRHAVEN : QUESTIONS ET REPONSES

The Beloff Group Inc.

- **Newspaper Advertisement: Barrhaven: Pitch In Your Plastics**

LAIDLAW
WASTE SYSTEMS LTD.

AN IMPORTANT NOTE ABOUT RECYCLING AND PLASTIC CONTAINERS

Dear Barrhaven resident:

Since the launch of the curbside recycling program in Nepean, Ottawa and Gloucester in 1987, the residents of Barrhaven have consistently demonstrated their commitment to recycling. The participation rate in Barrhaven is one of the highest in the region: more than 90% of Barrhaven households recycle.

This is one reason that Barrhaven has been selected to participate in a project to test different approaches to recycling plastic containers. These containers are recyclable, and diverting them out of our waste stream will conserve resources and help to reduce the pressure on landfill sites. We need to find the most efficient and effective way to collect and process plastic containers.

To do this, the cities of Nepean, Ottawa and Gloucester and Laidlaw Waste Systems, in conjunction with Environment Ontario, The Society of the Plastics Industry of Canada and TransOntario Plastics Recovery Inc, will be carrying out a plastics recycling research project in Barrhaven. Soon, we'll be asking you to place plastic containers such as margarine and ice cream tubs, yogurt containers and bleach bottles in your blue box rather than in your regular garbage. We'll be giving you a brochure which explains more about the project and tells you exactly what kinds of plastics we can, and cannot, recycle.

Then, beginning October 19, three specially modified recycling trucks will collect plastic containers as well as the usual newspapers, glass containers and metal cans from blue boxes in Barrhaven. The plastics we collect will be granulated and sold to plastics recycling companies, to be made into new products.

The research project will run until January 20, 1989. During the three-month test, we'll be gathering data on the amounts and types of plastic recovered, the time and labour required to collect and process the plastics, and the costs and benefits involved. Once this data has been analyzed, Laidlaw, in consultation with the cities of Nepean, Ottawa and Gloucester, will decide whether plastics recycling should be extended to all homes in the recycling program, or whether further research is needed. We'll keep you posted as the project unfolds.

This research project will provide important information that will contribute to solving the region's, and Ontario's, waste management problems. So please join with us in this community effort. If you have any questions about the plastics research project, or about recycling in general, please call the Laidlaw Recycling Hotline at 224-2914. Let's see the recycling spirit that's made Barrhaven Number One in the region!

Yours sincerely,

D V Bell

Douglas V. Bell
Vice President and General Manager - Ottawa
Laidlaw Waste Systems Ltd.

Recycling Plastics in Barrhaven

An Important Research Project

Congratulations! As a resident of Barrhaven, you are one of the best recyclers in the Ottawa-Carleton region.

Because of Barrhaven's record of high participation in the "blue box" recycling program, your community has been selected to take part in an important recycling research project. Beginning October 19, 1988, Barrhaven residents will be able to recycle rigid plastic containers as well as the usual newspapers, glass containers and metal cans.

Laidlaw Waste Systems and the cities of Nepean, Ottawa and Gloucester, in conjunction with Environment Ontario, The Society of the Plastics Industry of Canada (SPI) and TransOntario Plastics Recovery Inc., are carrying out a three-month research project in plastics recycling in Barrhaven. The purpose of the project is to identify the most efficient way to collect and process plastics for recycling, to investigate markets for recyclable plastics, and to determine the economics of the curbside recovery of plastics. The project is the first of its kind in Canada.

Recycling newspapers, glass containers and metal cans is just the first step in reducing our waste problems. We need to divert still more materials from the waste stream if we are to avoid a landfill crisis in the region. Plastics recycling is part of the solution. The information from the Barrhaven research project will help communities all across Ontario.

What to Do

It's easy to recycle your plastic containers. The inner two pages of this brochure explain which kinds of plastics can be recycled, and which cannot. (Why not post this handy reference on your refrigerator?) Simply rinse your recyclable plastic containers if necessary, and place them loose in your blue box along with your glass containers, metal cans and bagged newspapers.

When the box is full, set it out at the curb on garbage day, just as you always do. A specially equipped Laidlaw recycling truck will be around to empty your box.

We're counting on you to show once again why Barrhaven residents are the top recyclers in the region. If you have any questions, just call the Laidlaw Recycling Hotline -- we'll be glad to help.

SPI CANADA

OTTAWA
NEPEAN
GLOUCESTER

LAIDLAW

TRANSONTARIO
PLASTICS RECOVERY INC.

Environment
Ontario

YES!

Most rigid plastic containers can be recycled. Rigid plastic includes packaging that is brittle and packaging that is soft enough to squeeze. Plastic caps and lids can be recycled; others should go in the garbage. Place containers loose in your blue box — for good hygiene, please rinse food containers first.

Please recycle ...

- soft drink bottles
- mineral water, spring water and distilled water bottles
- margarine, butter, lard and shortening tubs
- ice cream tubs
- cheese/cheese spread/garlic spread tubs
- yogurt tubs and domes; yogurt drink bottles
- plastic fruit juice bottles (but not "juice boxes")
- peanut butter jars and pails
- plastic pudding tubs
- ketchup/mustard/relish/vinegar/barbeque sauce bottles
- table syrup bottles
- jam and honey tubs; honey squeeze bottles
- spice bottles, cake icing tubs
- shampoo and conditioner bottles, mouthwash bottles
- bleach, dishwashing liquid, fabric softener, laundry stain remover bottles
- window cleaner bottles
- rug shampoo and floor cleaning product bottles
- all-purpose household cleaner bottles
- hard plastic drinking glasses
- windshield washer antifreeze containers

Questions? Call the Laidlaw Recycling Hotline at 224-2914

NO!

Only rigid plastic food, beverage and household product containers are suitable for recycling. Plastic *wraps and films* are not acceptable. Toys and other specialty items may contain metal parts that will damage the plastic grinding machinery.

Please do NOT put any of the following plastics in your blue box.

- plastic bags (e.g., grocery bags, bread bags, milk bags, garbage bags, etc.)
- plastic wrapping (e.g., Saran Wrap, Handy Wrap, Stretch 'n Seal etc.)
- foam cups, egg cartons, meat trays, etc.
- plastic toys
- toothpaste tubes and pumps
- automotive batteries
- motor oil bottles (automotive or two-cycle small engine oil)
- any containers used for herbicides, pesticides and caustic cleaning compounds such as drain cleaner, oven cleaner, etc.

Remember...if in doubt, leave it out!

Biodegradable Plastics

Some new plastics are biodegradable — that is, they are designed to break down over time. These plastics contain special additives, and cannot be easily recycled into new plastic products.

There are not many biodegradable plastic containers on the market at the moment. Those that are biodegradable will generally have some kind of marking or label indicating the fact. These containers should go in your regular garbage — not your blue box.

A Word About Plastic Bags, Wraps and Films

You may be wondering why plastic bags, wraps and films are not acceptable. It is possible to recycle these products, but this research project is limited to rigid plastic containers. Rigid plastic containers tend to be more of a waste disposal problem because of their volume — they occupy a lot of space in landfill sites! This initial research project is concentrating on collecting and reducing the volume of these containers.

The equipment we're testing is designed to handle rigid plastics only, and plastic bags, wraps and films may interfere with its operation. We may recycle softer plastics at some point, but for the moment they'll just cause problems. So please ... put plastic bags, wraps and films in your regular garbage for now.

Questions? Call the Laidlaw Recycling Hotline at 224-2914

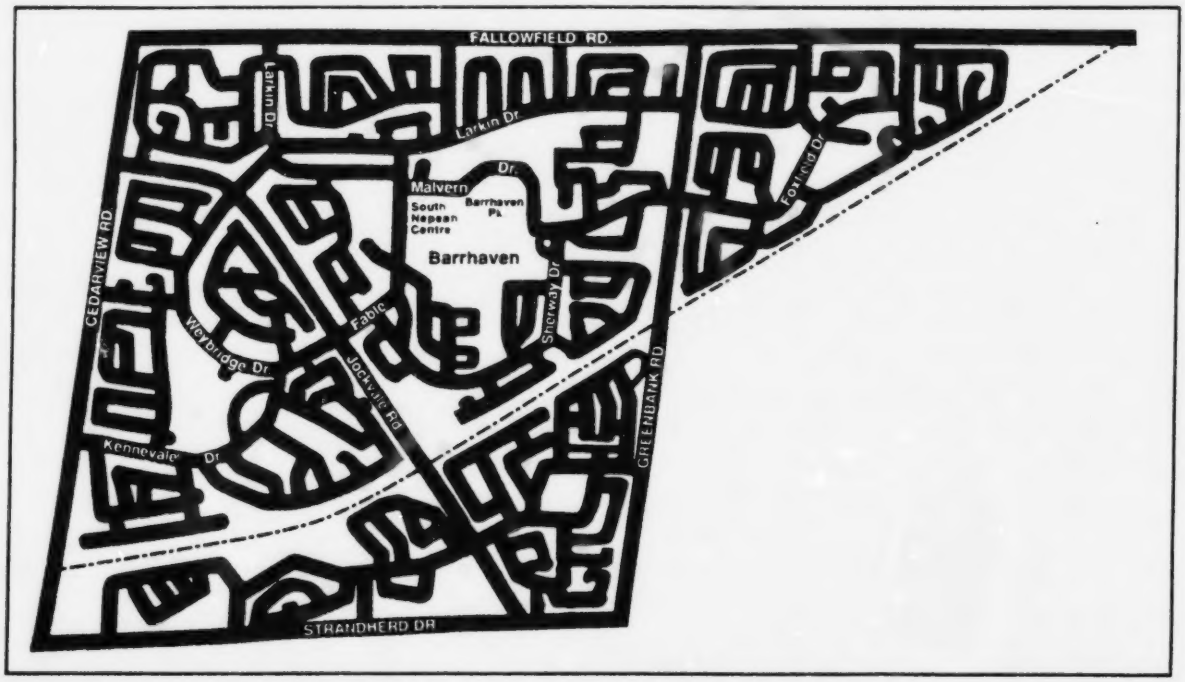
Barrhaven Project Will Test New Equipment

An innovative machine that grinds plastic containers right in the recycling truck will be tested for the first time in the Barrhaven research project. One of the three trucks used to collect recyclable materials in the neighbourhood has been fitted with a prototype granulator manufactured by Shred-Tech Limited of Cambridge, Ontario. The Laidlaw operator will hand-sort plastic containers out of each blue box and feed them into the granulator, which will grind and bag them for shipment.

The other two trucks have been retrofitted to make an extra compartment for plastic containers. (The regular recycling trucks used in Nepean, Ottawa and Gloucester have three compartments -- one for newspaper, one for glass containers and one for metal cans.) These trucks will transport plastic containers to Laidlaw's recycling processing centre at the Florence Paper facility on Sheffield Road in Ottawa. There, Laidlaw staff will sort through the containers and separate them out according to type and value. Then, the different types of plastics will be separately ground and bagged.

During the latter part of the study, one of these two trucks will be fitted with a prototype hydraulic perforator/flattener, which will be used to compact the plastic containers, reducing their volume.

The cost and convenience of each approach will be documented. The in-truck granulator reduces handling and labour, but doesn't allow separation of plastics by type. Different types of plastic command different prices, and the extra revenue from separating out high-value plastics may compensate for the additional labour. The Barrhaven research project will be the first to compare these different approaches, and the information it provides will be very valuable in designing plastics recycling programs throughout Canada.



Approximately 5,800 households will take part in the research project.

OCTOBER 17, 1988
FOR IMMEDIATE RELEASE

NEWS RELEASE

PLASTICS RECYCLING TO BE TESTED IN BARRHAVEN

A project to test different ways of collecting and processing plastic containers for recycling begins October 19 in the Nepean suburb of Barrhaven. The project is the first of its kind in Canada.

The project, which is being carried out under the auspices of the Nepean-Ottawa-Gloucester recycling program, is a joint effort between Laidlaw Waste Systems Ltd., Environment Ontario, The Society of the Plastics Industry of Canada (SPI) and TransOntario Plastics Recovery Inc. The test will run for three months.

Barrhaven residents will be asked to place rigid plastic food, beverage and household product containers in their blue boxes along with the usual newspapers, glass containers and metal cans. A wide variety of plastic containers will be recycled, including containers for soft drinks, margarine, ice cream, ketchup, shampoo, laundry products and other household products.

The three trucks used to collect recyclables in Barrhaven have been modified to accommodate plastics. In one truck, a fourth compartment has been added to hold plastic containers, which will be sorted, ground and bagged at Laidlaw's recycling processing yard at the Florence Paper facility on Sheffield Road in Ottawa. Another truck has been equipped with a unique prototype mobile granulator (made by Shred-Tech Limited of Cambridge, Ontario) which will grind the plastic containers right in the truck. The remaining truck has had a fourth compartment added and will be equipped with a prototype mobile perforator/flattener. The efficiency and cost-effectiveness of the different approaches will be compared.

The recovered plastic will be marketed to various plastics recycling companies. Part of the purpose of the study is to investigate different markets for the ground plastic, which can be made into a variety of plastic products, including plastic "lumber". The project will provide valuable information on the types and quantities of plastics in household waste, and on the economics of collection and processing.

The estimated total cost of the research project is $165,000, which is being split between Environment Ontario, SPI and TransOntario. "The plastics industry believes that recycling is an essential part of the solution to the growing problem of solid waste, and we are committed to the development of new technologies that will allow more household plastics to be recycled", says Ron Hayter, Director of Environmental Affairs for SPI.

Says project initiator Pat Humfries of TransOntario Plastics, "TransOntario Plastics Recovery's primary goal is to develop the effective recovery of plastic resources. We see this project as an important step in this process".

Residents of Barrhaven who have questions about collection schedules, what kinds of plastic containers can be recycled, etc. should call the Laidlaw Recycling Hotline at 224-2914.

- 30 -

Contact Person:

Doug Bell
Vice President and General Manager - Ottawa
Laidlaw Waste Systems Ltd.
224-4463

17 OCTOBRE 1988
POUR DIFFUSION IMMÉDIATE

COMMUNIQUÉ DE PRESSE

LE RECYCLAGE DU PLASTIQUE MIS À L'ESSAI À BARRHAVEN

Le 19 octobre débutera un projet visant à tester différentes méthodes de collecte et de traitement des contenants en plastique, en vue de leur recyclage, à Barrhaven, un quartier de Nepean. Ce type de projet est une première au Canada.

Le projet, mené dans le cadre du programme de recyclage de Nepean-Ottawa-Gloucester, est un effort conjoint de Laidlaw Waste Systems Ltd., Environnement Ontario, la Société des Industries du Plastique du Canada (SIPC) et TransOntario Plastics Recovery Inc. L'essai durera trois mois.

Les résidents de Barrhaven seront priés de placer les contenants en plastique rigide pour aliments, boissons et produits ménagers dans leurs bacs de récupération, avec les journaux, contenants en verre et canettes métalliques qu'ils y déposent déjà. Une gamme variée de contenants en plastique seront recyclés, y compris les contenants de boisson gazeuse, margarine, crème glacée, ketchup, shampooing, produits de lessive et autres produits ménagers.

On a modifié les trois camions habituellement utilisés pour la collecte des produits recyclables dans Barrhaven, afin qu'ils puissent accepter des contenants en plastique. Dans un camion, on a ajouté un quatrième compartiment pour les contenants en plastique, lesquels seront triés, broyés et mis en sacs à l'usine de recyclage de Laidlaw, chez Florence Paper, chemin Sheffield, à Ottawa. Le deuxième camion a été équipé d'un prototype de granulateur mobile, unique en son genre (fabriqué par Shred-Tech de Cambridge, Ontario) qui broiera les plastiques dans le camion même. Le troisième camion a également été pourvu d'un quatrième compartiment et il sera équipé d'un prototype de perforateur/écraseur mobile.

Le plastique ainsi récupéré sera vendu à diverses entreprises de recyclage. Un des objectifs du projet est d'étudier les différents marchés pour le plastique broyé, lequel peut servir à la fabrication d'une foule de produits de plastique, y compris le "bois d'oeuvre" en plastique. Ce projet permettra d'obtenir des données utiles sur les types et les quantités de plastique que l'on retrouve dans les déchets domestiques, ainsi que sur la rentabilité de la collecte et du traitement.

Le coût total prévu du projet est de 165 000 $, qui sera assumé par Environnement Ontario, SIPC et TransOntario. Comme le souligne Ron Hayter, directeur des questions environnementales à la SIPC, "l'industrie du plastique croit que le recyclage est une partie essentielle de la solution au problème croissant des déchets solides, et nous encourageons le développement de nouvelles techniques qui permettront un recyclage accru du plastique ménager".

Selon Pat Humfries de TransOntario Plastics, l'instigatrice du projet, "l'objectif premier de TransOntario Plastics Recovery est d'élaborer des méthodes efficaces de récupération des plastiques. Pour nous, ce projet est un pas important dans cette direction".

Les résidents de Barrhaven qui ont des questions au sujet des horaires de collecte, des types de contenants en plastique qui peuvent être recyclés, etc., devrait appeler le service d'information de Laidlaw, au 224-2914.

- 30 -

Personne-ressource :

Doug Bell
Vice-président et directeur général - Ottawa
Laidlaw Waste Systems Ltd.
224-4463

THE BARRHAVEN PLASTICS RECYCLING RESEARCH PROJECT: QUESTIONS AND ANSWERS

When does the plastics recycling research project start?

Plastics will be collected on an experimental basis in Barrhaven beginning October 19, 1988.

Why only Barrhaven?

The project is designed to test different approaches to collecting and processing plastics. The intention is to find the most cost-effective approach before expanding the whole Ottawa-Nepean-Gloucester recycling program to include plastics. Barrhaven was selected as the test community because of its high participation in the existing recycling program: more than 90% of Barrhaven residents regularly set out their blue boxes.

How many households are involved?

Approximately 5,800 households are involved.

Who is paying for the research project?

The project is being jointly funded by Environment Ontario, The Society of the Plastics Industry of Canada (SPI) and TransOntario Plastics Recovery Inc. The $165,000 budget covers the costs of purchasing and installing the prototype equipment to process the plastics, promotion, monitoring and analysis of results. The cities of Nepean, Ottawa and Gloucester are contributing indirectly to the project, in that the project will use the trucks and collection crews that already collect newspapers, glass and metal in Barrhaven.

What kinds of plastics can be recycled?

Rigid plastic containers (such as margarine, ice cream and yogurt tubs, soft drink bottles, bleach bottles, etc.) can be recycled. These containers tend to be more of a waste management concern because of their volume. Plastic bags and films are not being recycled in this particular project, which is designed to test equipment and collection methods for rigid plastic containers. Bags, wraps and films may interfere with the operation of the equipment designed to reduce the volume of rigid containers (e.g., the granulator).

What proportion of the residential waste stream do household plastics constitute?

Available data indicates that household containers constitute approximately 2 to 3 per cent of the residential waste stream by weight, but significantly more by volume. There is very little data on actual volumes or on the volume-to-weight ratio of plastic containers in the waste stream. Part of the purpose of this study is to generate data that will help to answer these questions.

How will the project work?

Residents of Barrhaven are being given a brochure that describes what sorts of plastic containers can be recycled. Beginning in mid-October, they will save household plastic containers in their blue boxes along with the usual newspapers, glass containers and metal cans, and set their full blue boxes out on the usual day.

The three Laidlaw trucks used to collect recyclable materials in Barrhaven have been modified to accommodate the plastics.

RECYCLING BACKGROUNDER

• In one truck, an extra divider has been added to make a compartment for the plastics. The plastics will be transported to the recycling processing centre at Florence Paper, 2475 Sheffield Road. There, they will be hand-sorted into different resin groups, ground and bagged.

• The second truck has also been equipped with an extra divider. It will be further equipped with a prototype mobile perforator/flattener (manufactured by Lummus Development Corp of Columbus, Georgia) to compact the plastics and reduce their volume. The compacted plastics will be transported to the Florence Paper facility for sorting, granulating and bagging.

• The third truck has been equipped with a granulator that will grind and bag the plastics on the truck. This prototype granulator is manufactured by Shred-Tech Limited of Cambridge, Ontario. The economics of on-truck processing will be compared with those of sorting and processing the plastics at the recycling centre.

What will happen to the plastic that is collected?

The ground, bagged plastics will be marketed to companies which use post-consumer plastics to make a variety of plastic products. Part of the purpose of the study is to ascertain the best prices and market opportunities available.

What is the advantage of sorting plastics?

Rigid household plastics fall into three main categories:
• polyethylene, used to make most food, beverage and household product containers
• polyethylene terephthalate (PET), used in soft drink bottles, and
• polyvinyl chloride (PVC) used in products such as shampoo bottles and vegetable oil bottles.

"Pure" lots of any of these plastics command a higher price than do mixed plastics. One of the purposes of this study is to determine whether it is cost-effective to sort plastics, or whether the extra handling costs negate the advantage.

What other sorts of data will the research project generate?

Detailed studies of all aspects of collection and processing will be carried out. TransOntario Plastics Recovery has carried out baseline time-motion studies of the existing recycling collection operation in Barrhaven, recording data on the number of stops made by the recycling truck, the amount (by weight) of paper, glass and metal collected, and the time required to complete a route. This has included a study of the time spent sorting the three materials into the truck at each stop.

A similar analysis will be carried out during the research project, to determine the impact of adding plastics to the materials to be collected.

• We expect that people will fill their blue boxes more quickly, and thus set them out more frequently. Analysis of the number of stops per number of homes will provide precise data on this.

• The amounts (by weight) of all four materials collected will be measured. Yields of all materials are often unusually high during pilot projects because participation increases as a result of the additional activity and promotion. By comparing the results against the baseline measurements, we will be able to adjust for any such increases.

• The time required to complete a route will be measured. This will allow us to calculate how much extra time is required to collect plastics, and what impact this has on route lengths, truck design, and labour and equipment costs. The amount of time elapsed at each stop will also be measured, both for comparison with baseline measurements and to provide a cross-check of the accuracy of the overall time estimates.

• The impacts of the three different approaches to collection and processing will be analyzed. Revenues from material sales will be compared with capital and operating costs to determine which method is most cost-effective. Available markets for sorted and unsorted plastics will be assessed.

How long will the project run?

The research project will run from October 19, 1988 until January 18, 1989.

What will happen after the project finishes?

The costs and benefits of the different approaches to plastics collection and processing will be analyzed. Laidlaw, in consultation with the cities of Nepean, Ottawa and Gloucester, will then decide whether to continue the collection in Barrhaven, extend plastics recycling to all homes in the recycling program or carry out further research. The other project sponsors will use the research results to help design effective and efficient plastics recycling programs elsewhere in the province.

What is The Society of the Plastics Industry of Canada, and why is it supporting this project?

The Society of the Plastics Industry of Canada is the trade association that represents the country's leading manufacturers and suppliers of plastic raw materials, products, machinery and molds.

As the volume of municipal solid waste continues to grow, it presents an increasingly serious problem to many Canadian cities and communities. Local opposition to new landfills and incinerators complicates the problem. SPI recognizes its social responsibility for its products and is committed to being involved in identifying solutions to waste management issues. The Barrhaven plastics recycling research project is important because it will provide useful information on how household plastics may be recycled as part of a curbside program.

What is TransOntario Plastics Recovery Inc.'s interest in the project?

TransOntario Plastics Recovery Inc.'s primary goal is to develop the effective recovery of plastic resources. To this end, the company has been the initiator and developer of the Barrhaven Plastics Recycling Research Project.

FOR MORE INFORMATION:

For more information on what kinds of plastics can be recycled, residents of Barrhaven should call the Laidlaw Recycling Hotline at 224-2914.

DOCUMENT D'INFORMATION SUR LE RECYCLAGE

LE PROJET DE RECHERCHE SUR LE RECYCLAGE DES PLASTIQUES À BARRHAVEN : QUESTIONS ET RÉPONSES

Quand débute le projet de recherche sur le recyclage des plastiques?

Les plastiques seront ramassés de façon expérimentale à Barrhaven à partir du 19 octobre 1988.

Pourquoi seulement à Barrhaven?

Le projet a pour but de tester différentes méthodes de collecte et de traitement des plastiques. Le but est de trouver la méthode la plus efficace et la plus rentable, avant d'étendre la collecte des plastiques à tout le programme de recyclage d'Ottawa-Nepean-Gloucester. Barrhaven a été choisi pour l'essai à cause du haut degré de participation des résidents de ce quartier à l'actuel programme de recyclage : en effet, plus de 90 % des résidents de Barrhaven utilisent régulièrement leurs bacs de récupération.

Combien de ménages sont visés par le projet?

Quelque 5 800 ménages.

Qui assume les coûts du projet de recherche?

Le projet est financé conjointement par Environnement Ontario, la Société des Industries du Plastique du Canada (SIPC) et TransOntario Plastics Recovery Inc. Le budget de 165 000 $ couvre les coûts d'achat et d'installation de l'équipement prototype servant à traiter le plastique, ainsi que la publicité, le contrôle et l'analyse des résultats. Les villes de Nepean, Ottawa et Gloucester contribuent indirectement au projet, car on utilisera pour celui-ci les camions et les équipes de ramassage qui servent déjà à la collecte des journaux, du verre et du métal à Barrhaven.

Quels types de plastiques peuvent être recyclés?

Les contenants en plastique rigide (par exemple, contenants de margarine, crème glacée et yogourt, bouteilles de boisson gazeuse, d'eau de javel, etc.) peuvent être recyclés. À cause de leur volume, ces contenants constituent un problème pour la gestion des déchets. Les sacs et pellicules en plastique ne sont pas recyclés dans le cadre de ce projet, lequel vise à tester l'équipement et les méthodes de collecte pour les contenants en plastique rigides. Les sacs, papiers d'emballage et pellicules en plastique peuvent nuire au fonctionnement de l'équipement conçu pour réduire le volume des contenants rigides (c.-à-d. le granulateur).

Quelle proportion des déchets ménagers représentent les plastiques?

Les données disponibles indiquent que les contenants de produits ménagers représentent environ 2 à 3 % du poids des déchets ménagers, mais une proportion beaucoup plus importante en volume. Il existe très peu de données sur le volume réel ou sur le rapport volume/poids de contenants en plastique dans les déchets ménagers. Entre autres buts, cette étude vise donc à obtenir des données qui permettront de répondre à ces questions.

Comment fonctionnera le projet?

Les résidents de Barrhaven recevront une brochure qui explique les différents types de plastiques qui sont recyclables. Vers la mi-octobre, ils pourront commencer à mettre de côté les contenants en plastique dans leurs bacs de récupération, avec les journaux, les contenants en verre et les canettes métalliques, et ils sortiront les bacs les jours habituels de ramassage.

Les trois camions de Laidlaw qui assurent la collecte des produits recyclables dans Barrhaven ont été modifiés afin de pouvoir recevoir les plastiques.

• Dans le premier camion, on a ajouté une cloison supplémentaire afin de créer un compartiment pour les plastiques. Ceux-ci seront transportés au centre de traitement et de recyclage de Florence Paper, au 2475 chemin Sheffield, où ils seront triés manuellement selon leur type de résine, broyés puis mis en sacs.

• Le deuxième camion a été pourvu lui aussi d'une cloison supplémentaire. De plus, il sera équipé d'un prototype de perforateur/écraseur mobile (fabriqué par Lummus Development Corp., de Colombus, Georgie), qui comprimera les plastiques afin d'en réduire le volume. Les plastiques comprimés seront transportés à l'usine de Florence Paper pour y être triés, broyés et mis en sacs.

• Quant au troisième camion, il a été équipé d'un granulateur qui broiera et mettra en sacs les plastiques dans le camion même. Ce granulateur prototype est fabriqué par Shred-Tech, de Cambridge (Ontario). Le projet permettra de comparer la rentabilité du traitement dans le camion par rapport à la rentabilité du tri et du traitement dans les centres de recyclage.

Qu'adviendra-t-il des plastiques ramassés?

Les plastiques broyés et mis en sacs seront vendus à des entreprises qui utilisent le plastique recyclé afin de fabriquer une foule de nouveaux produits de plastique. Le projet vise notamment à déterminer les possibilités qui s'offrent en matière de prix et de marchés.

Quel est l'avantage de trier les plastiques?

Il y a trois grandes catégories de plastiques utilisés pour les contenants ménagers :
- le polyéthylène, qui entre dans la fabrication de la plupart des contenants pour aliments, boissons et produits ménagers;
- le téréphtalate de polyéthylène, utilisé dans les bouteilles de boisson gazeuse;
- le chlorure de polyvinyle (CPV), utilisé dans les produits comme les bouteilles de shampooing et d'huile végétale.

Des quantités "pures" de ces plastiques valent plus cher que des quantités de plastiques mélangés. Un des objectifs de l'étude est de déterminer s'il est rentable de trier les plastiques, ou si les frais supplémentaires qu'entraîne le tri en annule les avantages.

Quels autres types de données découleront du projet?

Nous étudierons tous les aspects de la collecte et du traitement. TransOntario Plastics Recovery a réalisé des études préliminaires des temps et mouvements au sujet des activités de recyclage actuelles dans Barrhaven, et cette entreprise a recueilli des données sur le nombre d'arrêts faits par les camions de recyclage, la quantité (en poids) de papier, verre et métal ramassée, ainsi que le temps nécessaire pour effectuer un circuit. On a également étudié le temps nécessaire au tri de ces trois types de matériaux à chaque arrêt.

Une analyse similaire a été réalisée durant le projet de recherche afin de déterminer l'impact qu'aurait l'ajout des plastiques aux produits déjà ramassés.

• Nous prévoyons que les résidents rempliront leurs bacs de récupération plus rapidement, et qu'ils devront par conséquent les sortir plus fréquemment. L'analyse du nombre d'arrêts par maison donnera des données précises à ce sujet.

• Nous mesurerons la quantité (en poids) des quatre types de produits ramassés. La quantité de matériaux est souvent très élevée pendant les projets pilotes, car la participation est plus grande en raison du battage publicitaire et de la nouveauté des projets. En comparant ces résultats aux données de base, nous serons en mesure de compenser toute

augmentation de cette nature.

• Nous mesurerons le temps requis pour faire un circuit. Nous pourrons ainsi calculer le temps nécessaire à la collecte des plastiques, et son incidence sur la longueur des circuits, la conception des camions, et les coûts de main d'oeuvre et d'équipement. Le temps de chaque arrêt sera mesuré et comparé aux données de base; il nous permettra de vérifier la précision des estimations globales de temps.

• Nous analyserons l'impact des trois différentes méthodes de collecte et de traitement. Nous comparerons ensuite les recettes de la vente des matières recyclées et les frais d'investissement et d'exploitation, afin de déterminer la méthode la plus rentable. Nous évaluerons également les marchés possibles pour l'écoulement des plastiques triés et non triés.

Quelle sera la durée du projet?

Le projet de recherche durera du 19 octobre 1988 au 18 janvier 1989.

Qu'arrivera-t-il après le projet?

Nous analyserons les coûts et avantages des différentes méthodes de collecte et de traitement des plastiques. Laidlaw, en consultation avec les villes de Nepean, Ottawa et Gloucester, décidera alors si le ramassage des plastiques se poursuivra dans Barrhaven, s'il sera étendu à tout le programme de recyclage, ou si d'autres recherches seront nécessaires. Les autres participants au projet utiliseront les résultats pour concevoir des programmes efficaces de recyclage des plastiques ailleurs dans la province.

Qu'est-ce que la Société des Industries du Plastique du Canada, et pourquoi appuie-t-elle ce projet?

La Société des Industries du Plastique du Canada est l'association industrielle qui représente les principaux fabricants et fournisseurs canadiens de matériaux et produits bruts, de machinerie et de moules utilisés pour la fabrication des plastiques.

Le volume des déchets solides produits par les municipalités ne cesse d'augmenter, et il représente un grave problème pour de nombreuses villes et collectivités canadiennes. Dans de nombreux endroits, l'opposition aux projets d'enfouissement ne fait qu'aggraver le problème. La SIPC reconnaît sa responsabilité sociale envers ses produits et s'est engagée à participer aux efforts visant à trouver des solutions aux problèmes de gestion des déchets. Le projet de recherche sur le recyclage des plastiques à Barrhaven est important, car il permettra d'obtenir des données utiles sur la façon dont les plastiques peuvent être récupérés dans le cadre du projet de ramassage des produits recyclables sur le trottoir.

Quel est l'intérêt de TransOntario Plastics Recovery Inc. dans ce projet?

L'objectif premier de TransOntario Plastics Recovery Inc. est d'élaborer des méthodes efficaces de récupération des ressources que constituent les plastiques. À cette fin, l'entreprise a été l'instigateur et le concepteur du Projet de recherche sur le recyclage des plastiques de Barrhaven.

POUR DE PLUS AMPLES INFORMATIONS :

Les résidents de Barrhaven qui ont des questions au sujet des types de contenants en plastique qui peuvent être recyclés devrait appeler le service d'information de Laidlaw, au 224-2914.

BARRHAVEN:

Pitch In Your Plastics

Thanks Barrhaven residents, for pitching in your plastics. Your continuing support of our recycling project is important.

Please do not include items such as plastic bags, plastic wrapping, foam products such as cups, egg cartons and meat trays, toothpaste tubes and pumps, motor oil bottles.

If you have any questions don't hesitate to contact the Recycling Hotline at 224-2914.

SPI

Environment Ontario

TRANSONTARIO PLASTICS RECOVERY INC

OTTAWA
NEPEAN
GLOUCESTER

LAIDLAW

APPENDIX 3: Plastic Recycling in Ontario

Recently, two other Ontario municipalities began to add plastic containers to their BB system. The City of Guelph in the County of Wellington added other rigid plastics to their previous PET only. Metropolitan Toronto and Consolidated Fibres Limited, had noticed that in addition to PET other plastic containers were present from the start of the BB collection. Metropolitan Toronto officially expanded its program to accept all rigid plastic bottles only, on May 3, 1989. Data presented below provide a comparison of the types of plastic placed out for pick-up.

The three programs are uniquely different: Barrhaven did not permit any plastic in the recycling mix prior to the pilot study; Metro Toronto is a brand new program with PET an important recyclable from the beginning; and the City of Guelph in Wellington County has a very strong participation in PET and other recyclables. Therefore, aside from confirming the breakdown of plastics resins initially present, the data also serve to support the aggressiveness with which Ontario municipalities can and are willing to pursue plastics recycling on their own.

Cases	1.[31]	2.[32]	3.[33]	4a.[34]	4b.
HDPE/PP	75.0%	76.0%	64.2%	65.7%	59.7%
PET	12.5%	10.8%	26.6%	25.4%	32.3%
Other (PS.PVC)	12.5%	13.2%	9.2%	8.9%	9.2%

---

[31] Cases 1 and 2 are from the Barrhaven study. In case 1, a sample of plastics(1,182 lbs.) was separated visually by three industry/research experts, November 8th, 1989.

[32] In case 2, an 1800 lb. granulated sample was divided into three lots, and separated by commercial process. (Applied Polymer Technologies Inc.).HDPE/PP and PET were specifically and the residual "Other" is assumed to be PS/PVC.

[33] 116.5 tons were collected from Metro Toronto from October,1988 to June, 1989 and then sorted at Consolidated Fibres Limited into "Other" and "PET". An 800 pound sample of "Other" was visually sorted into fractions by Du Pont Canada, Inc. (June 8th, 1989) and yielded 88%-HDPE/PP (polyolefins) and 12%-PS/PVC,respectively.

[34] Wellington County, comprising the City of Guelph and the rest of the County has been collecting PET for a year. The PET reported represents their collection August, 1988to March, 1989. On April 1st, 1989, the City of Guelph, only went to collection of rigid plastic containers. The split in recyclables collected is City/County: 73/27. Since April, all plastic containers have been baled together and sent to market.The percent PET in the mixed plastic bales was calculated in two ways.
4a) The quantity of PET was assumed equal to the average of the four preceeding months, and that 27% of this PET came from the rest of the County.
4b) The quantity of PET collected here was assumed to increase following a Least Mean Squares treatment of all preceding PET data, and that 27% of this PET came from the rest of the County.

Appendix 4: Glossary of Acronyms

APT	Applied Polymer Technologies
BB	Blue Box
HDPE	High Density Polyethylene
MSW	Municipal Solid Waste
PE	Polyethylene
PET	Polyethylene terephthalate
PO	Polyolefins (a generic term comprising PE, PP, PB, etc.)
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl chloride